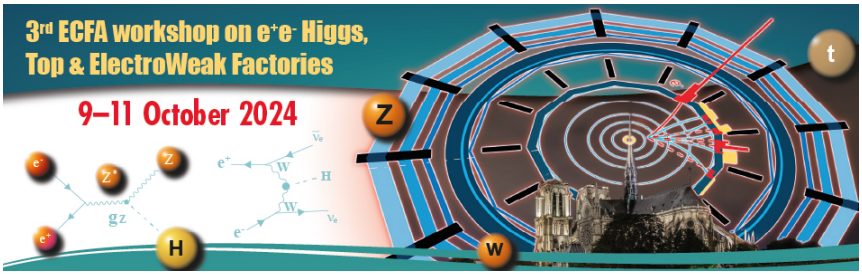

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Non-universal probes of Higgs compositeness: New bounds and prospects for tera-Z

Thursday 10 October 2024 11:00 (20 minutes)

We study the leading loop-level phenomenology of composite Higgs models via the effective field theory of a strongly interacting light Higgs and top quark (SILH+TQ). We systematically analyze the renormalization group evolution (RGE) of tree-generated operators in the SILH+TQ scenario, finding large mixings of flavor non-universal operators into those affecting electroweak precision observables. Flavor non-universal effects are accounted for by examining three options for the top mixing. In the most phenomenologically viable case of a fully composite t_R, we show that the strongest bound on the natural parameter space comes from next-to-leading log running of the 4-top operator $(\bar{t}_R\gamma_\mu t_R)(\bar{t}_R\gamma^\mu t_R)$ into the Peskin-Takeuchi T parameter. In general, we find that this 2-loop effect allows existing electroweak precision data to give better constraints on 4-top operators compared to high-energy probes from top production at the LHC. Independent of the top mixing, we find that a future tera-Z machine has the potential to probe Higgs compositeness up to a scale of m_*
$gtrsim25$ TeV.

Primary author: STEFANEK, Ben (King's College London)

Presenter: STEFANEK, Ben (King's College London)

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